

(Demo) Annual Narrative



FWSANV-0174



Malheur National Wildlife Refuge

Burns, Oregon

Narrative Report for period of May 1 to August 31, 1948

Roster of regular personnel

Jehn C. Scharff	Superintendent
Marselle Leake	Refuge Mechanic
Lloyd E. McKibben	Refuge Maintenance Foreman
Ray C. Erickson	Refuge Manager
George M. Benson	Reservation Protector
Arvin H. Olswold	Clerk-Stenographer
Albert Olofsen	Refuge Aid
Daniel S. Willey	Refuge Maintenance Man
Lilburn E. Oster	Refuge Aid
Alfred S. Ludi	Laborer-Patrolman
Kenneth E. Wolf	Clerk-Stenographer

Roster of temporary personnel

Elmer T. Ash	Dragline Operator
Lauren H. Jordan	Oiler
Frederick E. Briggs	Student Assistant
George L. Thompson	Tractor Operator
George W. Thompson	Tractor Operator



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## I. GENERAL

### A. Weather Conditions.

The spring and early summer of 1948 were much wetter than those of 1946, and warm weather came earlier. A summary of climatological data recorded at this station is presented as follows:

<u>Month</u>	<u>Precipitation</u>	<u>Maximum temperature</u>	<u>Minimum temperature</u>
May	1.43	86	20
June	2.08	93	39
July	.20	91	36
August	<u>.61</u>	<u>90</u>	<u>36</u>
Total & extremes	4.32	93	20

Precipitation records for the P-Ranch and Diamond weather stations were:

<u>Month</u>	<u>P-Ranch</u>	<u>Diamond</u>
May	2.42	1.85
June	2.81	2.70
July	.27	.32
August	<u>.15</u>	<u>.08</u>
Totals	5.65	4.95

Plant growth was rapid after the heavy precipitation of May and frequent rains in June continued to provide adequate moisture for local plant cover and crops. July was quite dry, as usual, and slightly more rain fell in August.

### B. Water Conditions.

Surface elevations of Malheur Lake as recorded on the lake gauge at the mouth of the Blitzen River during the four months were as follows:

<u>Month</u>	<u>Gauge readings</u> <u>Mouth of the Blitzen River</u>	
	<u>High</u>	<u>Low</u>
May	4091.92	4091.92
June	4093.66	4092.00
July	4093.77	4093.40
August	4093.17	4092.96



In extreme contrast with the spring and summer of 1947, water levels of ponds, streams and canals were high during May, June and July throughout most of the refuge, and water conditions were still good at the close of the period. Due to heavy snowfall during April and rapid melting and run-off during May and June, such a great volume of water was released in the Blitzen drainage that the river channel and canals of the valley were unable to accommodate the peak of the run-off. The consequent overflow caused considerable deterioration of portions of the dikes, especially in the vicinity of the Witzel Patrol Station and in the Buena Vista area. High water conditions persisted throughout most of June.

Malheur Lake levels, responding to floodwaters from the Steens Mountains and also from the Silvies drainage rapidly rose in June and held well throughout the next two months, beginning to decline after the middle of August. On June 1, water began to flow out of the lake through the Narrows. In view of the rapid rise the level of Malheur Lake, a channel was blasted through Cole Island Dike just south of the Trappers' Cabin and a strong head of water flowed into the shallow eastern section.

In response to the re-flooding of the margins of Malheur Lake following the dry 1947 season, as well as the flooding of the eastern section, a heavy stand of sago pondweed quickly established itself and fruited heavily. These areas quickly were occupied by late summer post-breeding ducks, principally mallards, as well as duck and goose broods.

As a consequence of the flooding in the Blitzen Valley, a number of terrestrial duck nests were flooded and a certain loss of pheasant clutches might be expected. The abundance of large broods of pheasants later in the summer indicated, however, that re-nesting greatly offset much of the earlier setback resulting from flooding losses. Since most goose nesting had been completed before the flooding, few, if any, goose clutches were lost from this factor.

Similar runoff water conditions were experienced on Silver Creek flowing into the Double O Unit. Silver Creek ran extremely high for a short time which resulted in much damage to fences, water control structures, bridges, roads and other physical improvements.

#### C. Fires.

No fires on the refuge or in the immediate vicinity were reported during this period. The wet summer was certainly a contributing factor in fire prevention as well as care exercised by the travelling public.



## II. WILDLIFE

### A. Migratory Birds.

#### 1. Populations and Behavior.

The cold weather of April seemed to delay the nesting of most species of ducks, although the earlier nesting Canada geese seem to have been affected less by the inclement weather which came during the peak of their nesting season. Another factor which seemed to influence the time of nesting as well as the choice of nesting sites was the water condition, especially in the Blitzen Valley and in Malheur Lake.

Whistling swan. Only three whistling swans were known to have remained this summer. Of these, one stayed in the trumpeter swan enclosure at Sod House springs where it received occasional persecution from the trumpeters. An earlier wing injury prevented it from migrating north with others of its kind. The other two swans were found in a remote pond of Unit 7. One of these could fly but the other, almost too weak to stand, was extremely emaciated and very heavily infested with bird lice. It was taken to refuge headquarters and confined, first being dusted with sodium fluoride, but it died a few days later.

The first two fall arrivals were noted on the Double-O Ranch Unit ponds on August 12, and by August 24, a dozen swans had appeared. No additional swans were seen by August 31.

Trumpeter swan. Although about three fourths of the trumpeters again paired, none showed any inclination to nest. The 13 birds seemed to be in excellent physical condition and were well into the flight-feather molt on August 31.

Canada goose. Water levels in the Blitzen Valley were about average and emergent vegetation was in good condition through most of the goose nesting season. By the time that most goose broods were hatching, however, much additional water area was available due to a heavy run-off from the Steens Mountains. A few nests located on dikes and low islands in some of the upper valley units probably were flooded, but since most nests were located on muskrat lodges or on substantial vegetation substrates with an abundance of available material for building up the nest structure, the proportion of goose nests lost to high water was small, perhaps less than five percent throughout the refuge.

The Buena Vista and Knox Swamp ponds again contained the heaviest nesting concentrations, averaging 0.7 and 0.8 nests, respectively, to the acre. Other more dense groupings of nests were found in small, scattered areas on dikes and islands. About 5,000 breeding geese produced 4,000 goslings.



Gosling mortality seemed negligible in the Blitzen Valley ponds and sloughs where much late water provided ample rearing habitat. However, this same factor allowed the broods to disperse and reduced the number that were encountered daily. Except for early low water conditions, Malheur Lake remained at desirable levels throughout most of the waterfowl breeding season. Nesting populations of geese and other waterfowl are presented in Table 1.

Data are available on 145 Canada goose nests this year (Table 2). The average clutch size was 4.3 eggs and the nesting success was 85.9 percent. Raven plundering was the main cause of nest failure and minks were the second most important predators.

April 16 was the first known goose hatching date and the average brood contained 3.7 goslings. Since broods tend to merge at an early date, brood counts of geese in areas of heavy production are subject to a wide degree of error. Brood counts of the downy goslings less than two weeks old seem to be fairly reliable, especially with isolated broods. The last goose broods were hatching about the first week in June.

The first molted flight feathers of Canada geese were noted along dikes on May 24, and the peak of the flightless period was during the last ten days of June. Some flightless geese were seen as late as the first week of August.

Non-resident geese began to arrive on the refuge just after the middle of June, but the main flight did not appear until the middle of August when 19,000 geese were believed to be on the refuge. At the end of the period, an estimated 27,000 Canada geese were occupying Malheur Refuge, about 4,000 being seen in 40 acres of wheat in Unit 6 on a late afternoon in August. The evening trips to the grain fields from the Malheur Lake area and Diamond Swamp usually began about 4:30 p.m. and the birds returned about 7:30 p.m., or just before dark. The morning feeding period extended from daylight (5:30 a.m.) to about 8:30 a.m., and the remainder of the day and night was spent in the marsh, on dikes or in hay lands.

Ducks. The duck breeding population has increased slightly over that of last year, perhaps largely a result of a greatly expanded water area and improvement of nesting cover and plant foods on Malheur Lake. Hardstem bulrush, which covers most of Malheur Lake, shows a thrifty growth this year, and in the areas which previously were densely grown with water milfoil and were dry at the end of last summer and early fall, fine stands of sago pondweed have returned.



Nesting Species	1948 populations compared with those of 1947		
	Increased %	No Change %	Decreased %
Canada Goose	10		
Mallard			10
Gadwall	10		
Baldpate		0	
American Pintail			20
Green-winged Teal		0	
Blue-winged Teal			20
Cinnamon Teal	10		
Shoveller			10
Redhead	10		
Canvas-back			20
Lesser scaup		0	
Ruddy duck		0	
American Merganser		0	
Status of all nesting resident ducks	10		
American Coot		0	
Sandhill Crane	10		

Table 1      COMPARISON OF WATERFOWL NESTING POPULATIONS FOR 1947 and 1948 SEASONS.



Species	NESTS				Unknown fate	EGGS	
	Total	Success- ful	UNSUCCESSFUL			Total	Average Complete Clutch #
			Final Attempt	Prob. followed by re nesting			
Canada Goose	145	73 85.9%*	22	2	45	494	4.3
Mallard	40	9 42.9%	12	3	16	291	8.3
Gadwall	27	12 80.0%	3		12	232	9.1
Cinnamon Teal	4	3 75.0%	1			34	8.5
Redhead	17	6 55.5%	5	1	5	159	10.9
Canvas-back	4	4 100%			4	39	9.7 ***
TOTALS	237	107	43	6	82	1249	

\* Nests listed under "Unsuccessful, probably followed by re nesting" and "Unknown fate" are omitted from nesting success percentage computations.

\*\* Averages of clutches involve only those nests already being incubated.

\*\*\* Average complete clutch of canvas-back nests involve an average of 6.7 canvas-back eggs and 3.0 redhead (parasitic) eggs.

Table 2

SUMMARY OF NESTING SUCCESS AND CLUTCH DATA ON THE MALHEUR REFUGE, OREGON in 1948



For convenience, Table 1 sets forth the trends in breeding populations of the more important waterfowl nesting species at Malheur Refuge. Although five species show increases and five show decreases, the general upward trend of the entire group resulted from increases in gadwalls, our most common nesting duck, and in redheads, cinnamon teal, and Canada geese. The total number, however, still is less than that of 1946.

The duck nesting season was about three weeks later this year than in 1947. A summary of nesting success and clutch data of ducks is included in Table 2. It will be noted that, of the species listed, gadwalls seemed to have a successful nesting season with a success of 80 percent while mallards were below the 50 percent mark. Both of these rates of success were later substantiated in number of broods seen. Although cinnamon teal and canvas-backs show high success percentages, the small number of broods may not constitute a true sample, although brood census work indicated a successful season for all species except mallards, and to a lesser extent, redheads. It was noted that the later nesting mallards had a success percentage of over 60 percent.

The first duck brood, that of a mallard, was seen on May 28, but broods were not commonly seen until late in June. The last intact broods were counted during the first week of September. A total of 915 duck broods were counted, providing information presented in Table 3. In analyzing the brood information by classes, comparison between classes in each month should be avoided since that is no indication of brood mortality, but mainly a manifestation of clutch-size reduction usually accompanying the advance of the nesting season due to progressively smaller clutches of re-nesting birds. Rather, since the brood classes I, II and III are separated by nearly a month of elapsed time, brood groups in class I in June should be compared with brood groups in class II in July, and class III in August. In this way, a better estimate of duckling mortality will be obtained. Should this method not be followed, successive brood classes will often be found to increase in size due to other factors than "compounding" of broods. Thus, a comparison of the sizes of broods under the three classes for the entire season can be no criterion of actual mortality, regardless of the accuracy of the season's brood counts, unless representative samples of all classes for all parts of the breeding season are represented. Single "spot censuses" of broods can contain very little information of real value in computing duckling mortality unless a correction factor be devised which makes allowance for this seasonal variation in clutch size and mortality rate.



Species	June			July			Aug			Seasonal Totals		
	Brood Class			Brood Class			Brood Class			Brood Class		
	I	II	III	I	II	III	I	II	III	I	II	III
Mallard	4/31*			18/130	7/49	8/58		2/12	1/7	22/161	9/61	9/65
	7.7			7.2	7.0	7.2		6.0	7.0	7.3	6.8	7.2
Gadwall	2/16			515/4109	34/255	4/27	7/39	34/238	6/43	524/4164	68/493	10/70
	8.0			8.0	7.5	6.7	5.6	7.0	7.2	7.9	7.2	7.0
Baldpate				3/29						3/29		
				9.7						9.7		
American Pintail				10/71	1/5	1/9		1/8		10/71	2/13	1/9
				7.1	5.0	9.0		8.0		7.1	6.5	9.0
Cinnamon Teal**				11/86	3/19	8/64	2/19	3/19		13/105	6/38	8/64
				7.8	6.3	8.0	9.5	6.3		8.1	6.3	8.0
Shoveller	1/10			6/33	1/4	2/19				1/2	7/43	3/21
	10.0			5.5	4.0	9.5				2.0	6.1	7.0
Redhead	4/22			113/828	30/235	7/44	3/20	11/86		120/870	41/321	7/44
	5.5			7.3	7.8	6.3	6.7	7.8		7.2	7.8	6.3
Canvas-back				1/7	5/25					1/7	5/25	
				7.0	5.0					7.0	5.0	
Lesser Scaup	1/9			2/17				1/6		3/26	1/6	
	9.0			8.5				6.0		8.7	6.0	
Ruddy Duck	1/5				15/83	19/144				15/83	19/144	
	5.0				5.5	7.6				5.5	7.6	
American Merganser				4/32	1/7	2/22				4/32	1/7	2/22
				8.0	7.0	11.0				8.0	7.0	11.0
BROOD TOTALS	13			683	97	51	12	52	7	701	155	59

\*Figure to left of slant indicates total broods; to right of slant, total ducks in broods; and lower number, average number of ducks in broods.

\*\*Tabulations opposite "Cinnamon teal" may have been either of this species or the Blue-winged teal.

Table 3. Duck brood data of the Malheur National Wildlife Refuge, Oregon, for 1948.



Unfortunately, the small samples of broods in many groups in Table 3 are inadequate for statistical treatment.

The first bands of mid-summer mallard drakes, a few of them entering the eclipse plumage, were seen June 9. The first main flight of mallards arrived the middle of June when 50,000 were estimated to be present. Another mallard flight arrived about a month later. About 100,000 mallards were on the refuge on August 31.

Comparatively few pintails remained on the refuge to nest, and the first late summer arrivals were seen August 1, increasing to 65,000 by August 31. Few if any gadwalls recognized as migrants, arrived on the refuge before the above date, but about 92,000 adults and juvenile birds were estimated to be on the refuge at that time.

Sandhill crane. An estimated 400 sandhill cranes, including both breeding and non-breeding birds, produced about 150 young this year. The first crane chick, from two to three weeks old, was seen on May 28, but most nests did not hatch until the first half of June. Migrant cranes began to appear about the first week of August and by September, as many as 250 could be seen daily in one of the refuge grain fields, when about 650 were believed to be on the refuge.

Shorebirds and waders. With increased water levels and a consequent reduction of exposed mud flats, fewer shorebirds have been seen on the refuge this summer than during last year. This is especially true of the sandpipers, dowitchers, avocets, stilts and willets. Killdeer showed no numerical change from last year, but long-billed curlews increased about 15 percent and Wilson's snipe about 20 percent. Gulls and terns were about as abundant as in 1947.

Although the Franklin's gull has been observed as a resident on this refuge during the past eight or ten years, (unpublished record), the first nest of this species was not found until this year. In their "Birds of Oregon" Gabrielson and Jewett do not list this gull as an Oregon resident or visitor. The nest, found near the center of Malheur Lake on June 7, 1948, was a floating structure of hardstem bulrush and contained three eggs. It was situated among scattered bulrush clumps among nests of black and Forster's terns. The water depth at the nest site was four feet. About six other pairs of Franklin's gulls were circling over the general area at the time the nest was found. This is believed to be the first nesting record for the Franklin's gull in Oregon.



The egret colony again contained an average number of birds and a new colony of about 16 pairs of white-faced glossy ibises was found about two miles west of Cole Island Dike in Malheur Lake. Nesting was just getting under way when the colony was found on May 25, and most nests had only one or two eggs in them.

Other waterfowl. The Western grebe is about 15 percent less common this year but other grebes are about as abundant. The first eared grebe nest was found on May 26. The first grebe chicks were those of a Western grebe and a pied-billed grebe seen on June 17, about two or three weeks old. The usual numbers of cormorants and pelicans resided at Malheur, and again, the latter were not known to nest here.

The American coot was less common this year than last year. Coot nesting was well under way by May 15.

## 2. Food and Cover.

With an increase in water levels in Malheur Lake since May 1, food conditions on this large nesting and feeding ground have shown a remarkable improvement. Throughout most of last year and during the first period this spring, the shallow remnant of Malheur Lake was a stagnant marsh grown with bulrush and milfoil. The levels rose rapidly after the middle of May, however, and throughout most of the previously dry areas, the milfoil was replaced with dense-growing sago pondweed, horned pondweed and muskgrass. The central open area of Malheur Lake which never became dry has retained its milfoil dominance, however, and is avoided by most waterfowl except coots and grebes. The broad margins of the lake have been most heavily populated with ducks and geese and the heavy inroads on the more desirable submergent vegetation are becoming noticeable. Vegetation conditions in the Blitzen Valley and Double-O Ranch Units have remained largely unchanged.

The seed production on most bulrushes has been good, that of the smartweeds was excellent, that of sago pondweed fair to good, and achenes were found forming on coontail in one pond of Unit 8. The vegetative growth of sago pondweed was again very good this year.

Emergent vegetation of the entire refuge has shown good growth during this summer and except for undesirably dense marshes in Units 2, 4 and 7, should be in good condition for nesting next season, barring unusual winter conditions such as high water, thick ice and rapid thaws accompanied by high winds.



Geese, mallards, pintails and cranes have found and are utilizing much of the 1600 acres of grain planted last spring, especially in the Grain Camp portion.

3. Botulism.

No botulism has been noted during this period.

4. Lead-poisoning, other diseases and accidents.

No victims of lead poisoning or other diseases were found. One female cinnamon teal flew into a barbed wire fence, where it died and was found hanging on a barb.

5. Banding.

Twenty-two Canada geese, five ducks and 59 local adult and juvenile coots were banded this summer. During the last week of August, the duck banding trap in the Buena Vista pond was repaired and conditioned for the fall banding season.

B. Upland Game Birds.

1. Populations and Behavior.

Ring-necked pheasants. Although the season was begun with a reduced breeding stock, the present population of pheasants exceeds that of last year by at least 15 percent because of an excellent nesting season. Adults and broods have been seen on most dikes of the refuge with the exception of the Double-O Ranch Unit.

Valley quail. Along with pheasants, quail have increased at least 15 percent and are especially common about the Paige Dam area in Unit 1; in Grain Camp and adjacent rocky hills; and around the Double-O Ranch buildings and willow thickets. Many other parts of the refuge contain one or more covies of quail.

Sage grouse. Grouse also are more common than last year by at least 10 percent, and are encountered on nearly all trips through the Blitzen Valley, most of them being seen in Units 8 and 10.

C. Big Game Animals.

Antelope. The status of antelope has not changed noticeably since last year. Predation must have been very light in view of the greatly reduced coyote population.



Mile Deer. Deer on the refuge are more abundant than they have been during the last five years, at least 50 being seen in the upper Blitzen Valley area on most evening trips along the Center Patrol Road. Many of the does are with twin fawns this year and most deer seem to be in good physical condition.

An exception to the preceding station is that of one four-point buck encountered in Unit 9 on August 5. The buck, still in the "velvet" appeared to be sleeping while standing, its head hanging low. Several pictures were taken of the deer in this attitude from about 30 feet. Aroused from its stupor, it ran about 150 yards along a dike, then plunged into and swam across a canal, turned, then returned to the near side. There it paused and started to drink slowly, its muzzle dropping below the water surface. When the observer came within six feet, the deer turned, began to swim back across the canal, seemed to lose its balance and rolled over on its side as the head and neck went under water. It struggled very weakly, moved its head and neck, and much white foam was lost from the mouth and nostrils. It was immediately dragged out of the water but could not be revived. There were no external abrasions or bruises, but the hair on parts of the neck was sparse or lost completely in places.

In a post mortem examination, the most obvious morbid condition was that of the lungs. At least two thirds of the anterior part of both lungs was riddled with cavities and channels filled with a caseous material and amber, gelatinous exudates were found in the pleural cavity. The badly deteriorated parts of the lungs were of a greenish-gray color. Certain glands of the neck and throat appeared diseased. The stomach was well filled, but the animal was quite emaciated, weighing about 125 pounds. Although the posterior third of the lungs was pink in color, a section through this part showed occlusion of most air passages. Specimens of both parts of the lungs were removed and fixed in formalin. This material has since been sent to Denver for examination by members of the Bureau of Animal Industry.

In addition to this sick deer, two other individuals have been seen recently which seem to be sick and are in an emaciated condition.

#### D. Fur Animals, Predators, Rodents and other Mammals.

Muskrat. The increased muskrat population of early spring seems to have produced a good crop this summer, although a lack of much lodge-building activity makes an accurate appraisal of their numbers impossible.



Feeding stations are now common in most vegetation throughout the lake, although at the beginning of the summer, most muskrats were found in the central half of the lake. The reason for this manner of distribution lay in the fact that the broad periphery of the lake was dry during the autumn of 1947 and muskrats had moved toward the central deeper water to build their winter lodges. After the lake borders began to expand late in May, the muskrats began to disperse into the newly re-flooded bulrush where the feeding stations appeared. Very little evidence of mortality from any disease, accident or predator was noted. Blitzen Valley muskrat numbers have not changed much this year.

Beaver. Beavers are common throughout the Blitzen Valley and in the Double-O area. Their damage to dikes caused a number of these structures to be washed out during the high water conditions early this summer. In order to economically maintain dikes, canals and other water-control devices, a large surplus of these rodents must be removed this winter.

Mink. Minks continued predation on duck nests following the goose nesting season, and more mink and mink "sign" were seen this year than during the six preceding ones. Most activity has been noted along the east side of Unit 3, along the Center Canal between Units 3 and 4, in the Buena Vista pond, and along the lower part of the Donner and Blitzen River. This predator's importance as a destroyer of nests and ducklings has not duplicated the damage formerly accomplished by coyotes, but a substantial increase in destruction by minks is apparent. In the interest of increased waterfowl production at Malheur, the numbers of mink will have to be greatly reduced during winter trapping.

Raccoon. Raccoons have remained about the same in numbers. Raccoon tracks are common in the apple orchard at P-Ranch where they feed on "windfall" apples.

Coyote. Few coyotes have drifted into the refuge from surrounding country since April when very few coyotes were around. Less than a dozen coyotes have been seen on the refuge this year by members of the staff, nearly all of them since July. This animal, which was one of our two most important predators in previous years, has been at least temporarily reduced to a role of minor importance. The absence of coyotes in hay lands and lack of coyote "moon-light serenades", however, is regretted by many residents.



Bobcats. Very little has been seen of bobcats this summer. A local report has suggested the presence of a cougar in the rough land to the south of the refuge, but this has not been substantiated. A deer heard thrashing in a thicket and found with its neck broken, apparently by a large animal, is the main basis for this report.

Porcupines. Continued casual suppression of porcupines has been practiced, but they remain in customary numbers.

Other species. Black-tailed jackrabbits and cottontails are very abundant. Meadow mice are very common and have done much local damage to vegetable gardens.

#### E. Predaceous Birds, including Crows, Ravens and Magpies.

Although the nesting season commenced with few ravens surviving the coyote-poisoning campaign of last winter, many flocked in from other localities, and during some days in August, as many as one hundred could be seen along Cole Island Dike. Many others were seen in the Blitzen Valley, and at least three dozen were shot during the spring and summer, while about a dozen nestlings were destroyed. It is planned to attempt further reduction of ravens by poisoning them at certain rallying points later this fall.

The population of crows and ravens in parts of the Blitzen Valley and in the Double-O Ranch Unit has assumed such proportions that nest-destruction and trapping of these species shall be intensified. Duck nesting losses in areas heavily populated with crows and ravens have been greater than in other situations.

Resident hawks and owls remain in usual numbers, although much willow nesting cover destroyed in the south part of Unit 10 has caused the former occupants to find new nesting situations to the north and south.

#### F. Fish.

Seining of water distribution lateral ditches was attempted in order to learn the quantities of fish that may be lost into irrigated fields on the refuge, but the effort was largely unsuccessful for lack of proper equipment. The small-mesh seine was too dense for rapid dragging through water and the swiftly swimming trout, if any were present, could easily have outmaneuvered it. Although the water in these outlets was clear later in the season, no trout were seen in such situations.



Early fishing in the Bridge Creek area produced some fine rainbow trout measuring as much as 29 inches in length, while later fishing seemed to be better in the upper tributaries of the Blitzen River. Early fishing in the Blitzen was relatively unproductive because of excess sediment and high water conditions.

### III REFUGE DEVELOPMENT AND MAINTENANCE

#### A. Physical Developments.

The major job during the early part of the period was the protection of the planted grain from flood waters. Several miles of dike in varying widths and heights were provided to divert water from the Malheur Lake plantings and considerable work done in the Blitzen Valley to save the grain of that area. One canal over a mile in length and about thirty feet in the bottom was provided to by-pass the Mud Lake waters as this entire lake bed was planted to grain. This canal work was done in cooperation with other grain farmers of the area. One break through of the water into the Malheur Lake grain was controlled by plowing sod and building a three hundred feet dam by packing the sod piece at a time and building it into a three feet high dam. In addition to the actual work required to control the water, much time was required in constant patrol for about six weeks to ferret out weak spots for repair and strengthening.

Under the Soil and Moisture program four and a half miles of canal was cleaned and one and one half miles of dike rebuilt and repaired. A total of 43,600 yards of earth was moved with the Koehring dragline.

The materials were purchased and delivered on the ground for new trumpeter swan enclosures at the Double O. The completion of these pens is awaiting pending action on a proposed land exchange with the Bureau of Land Management.

Work was started on the rehabilitation of a dwelling at the P-Ranch to replace the one lost by fire. During this period only contributed labor of refuge personnel was used on this building. The foundation was poured and the building placed in position. Old partitions were removed and new ones put in place. Water lines were dug and the building reproofed.

The starting motor on the Caterpillar light plant was given a complete new overhaul and ordinary maintenance of equipment was performed.

Hay was provided at the refuge Headquarters for winter use and the P-Ranch barn was filled with sixty tons for use of the refuge horses during winter time.

One quarter mile of new boundary fence was completed on the old Springer place near refuge headquarters. Fences generally were maintained and repaired where needed.



Fifteen miles of the Malheur Lake fence was given extraordinary maintenance. Posts were replaced where required, corners were rebuilt, the wire restapled and gates rebuilt. A considerable amount of this work remains as this fence was placed with untreated cedar posts which have largely served their life expectancy.

Spot repairs were made on the telephone system and considerable stubbing done where required. The Double O line was given a good repair job by Maintenance Man, Dan S. Willey.

Roadsides were mowed and cleaned of willows, grass and weeds so that future blading could be done and also to add to the general fire protection.

Refuge horses were vaccinated for brain fever, their feet trimmed, the colts branded and all removed to summer pasture during the period.

A new self propelled combine was received during the period and the small John Deere was transferred to the Medicine Lake Refuge. The new combine is a twelve feet cut and should add materially to the annual grain harvest.

A considerable amount of time was spent by all refuge personnel in repairing flood damage after the water begun to recede. The general damage is much greater than can be repaired with the ordinary personnel and funds available.

#### B. Plantings.

##### Cultivated Crops.

During the early part of the period, seeding of grain was continued and 39 acres of rye, 150 acres of wheat, 140 acres of oats, and 331 acres of barley were planted. This acreage of over 900 acres was short of the planting objective, but so much time was required to protect the seeded grain from flooding that it was necessary to discontinue planting.

In addition to the above, 300 acres of share crop grain was planted in the Blitzen Valley.

### IV ECONOMIC USE OF REFUGE

#### A. Grazing.

Owing to late water and late nesting and reneesting of ducks and upland game birds, harvesting was postponed for a time, and it wasn't until the latter part of the period that mowing was completed. A considerable amount of hay yet remained to be stacked at the close of the quarter.



Continued and late high water resulted in some good meadow areas being flooded out, but the quantity and quality of forage on much of the higher ground was such that it more than offset any shortage caused by flooding.

The Double O area continues to improve and the late water contributed to much forage improvement of this particular Unit.

## V. FIELD INVESTIGATION OR APPLIED RESEARCH

### A. Progress Report.

In the first 1948 narrative report a brief outline of some proposed projects of investigation was presented. These project titles are herein repeated and include the accomplishments under each project.

#### 1. Waterfowl Life history studies.

a. Migration and distribution data have been assembled in this and the preceding report.

b. Nesting studies involved the finding of 145 goose nests and 92 duck nests and recording of information on their location, nesting cover and nest materials, and fate of nests and eggs.

c. Brood counts throughout the season have been an important part of the life history studies. A total of 915 duck broods were included in the 1948 census.

d. Observations on sickness and disease will be recorded at each opportunity and preventative measures taken whenever possible.

#### 2. Habitat utilization.

a. Notes on actual utilization of habitat, and especially, changes in utilization both seasonally and yearly are being recorded.

b. Changes in agricultural practice such as those arising from varying haying and grazing "pressure," and in changes from haying to grain cropping, especially in marginal areas, will be watched for both beneficial and adverse effects on waterfowl nesters and migrants.

#### 3. Habitat improvement.

a. Constant watch is made of possibilities for habitat improvement, both for nesting and migrating waterfowl. Observations on large areas which might be impounded to greater depths for increased utilization by geese and certain diving ducks or at least partly drained to form grassy meadows which would increase grazing facilities for geese and stock and provide nesting for most puddle ducks, are being continued.



#### 4. Bird-banding.

a. Banding of summer resident adult and juvenile waterfowl was not very successful this year. One drive of Canada geese at Boca Lake in Unit 3 was begun too late and with too few men to capture many. This drive was undertaken on July 9 with six men, three of them in boats (one with a motor), and the other three followed along the shores. It is believed that in future goose banding work on Boca Lake, a minimum of four boats (two of them with motors) and two men walking along the shores will be required for a successful drive. Furthermore, the banding of geese by driving should be accomplished no later than July 3 and preferably, prior to June 30.

The duck drive on the same lake was undertaken on August 25 with an even smaller crew, two men being in boats with motors and two following along the shores afoot. At least two thousand ducks and perhaps four times as many coots were driven to the mouth of the trap, but with only two boats operating outside the trap to "herd" them in, they dashed between and around the boats. The time for driving them was about right for most of the juveniles were from six to nine weeks old and no downy ducklings were seen. A large number of flightless adult ducks also was present.

This drive may have been accomplished successfully had we undertaken the task with the crew recommended above for goose-driving, with the addition of one more boat or canoe. Some minor changes in the Boca Lake trap also will be made during the coming year which will increase its efficiency.

The usual fall banding work will again be carried on at the Buena Vista trap in Unit 8. This trap already has been repaired and reconditioned for the fall banding. Although a few diving ducks are caught in this trap, the proportion of divers to puddle ducks is very small. Construction of another trap on the bank of the Blitzen River just below headquarters is now being contemplated. Previous traps in this general area have been successful in capturing a large variety of ducks.

#### 5. Muskrat management.

Observations on muskrat distribution and abundance on Malheur Lake and in other parts of the refuge have been made during the past summer. The lack of muskrat lodges around the shallow periphery of Malheur Lake which was without water last fall had a direct effect on the distribution of nesting Canada geese this year. About three fourths of the geese on the lake nested in the deeper portion inhabited by the muskrat population during the winter, while the remainder had to build their nests in the bulrush without the benefit of the substantial support provided by the lodges. A few, old, semi-floating, abandoned muskrat lodges remained and most of these were occupied in nesting or were used as "sentinel" pests.



## WATERFOWL

Refuge Malheur Months of May to August 1948

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan	2	8/12	14	8/24					16
II. <u>Geese:</u> Canada goose Cackling goose Brant <u>White-fronted goose</u> Snow goose Blue goose			27,000	8/31			400	4,000	35,000
					2	5/12			50
III. <u>Ducks:</u> Mallard Black duck Gadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck Am. merganser			100,000 92,000 600 65,000 6,000 150 28,000 3,000 30,000 60 700 2,300 30 18,000 200	8/31 8/31 8/31 8/31 8/31 8/31 8/31 8/31 8/31 8/31 8/2 8/31 7/26 8/31 8/31			37 495 2 10 10 23 10 116 7 3 34 7	30,000 45,000 150 8,000 2,000 100 16,000 8,000 20,000 600 2,000 15,000 100	160,000 100,000 800 75,000 7,000 200 30,000 14,000 35,000 65 1,300 2,500 30 21,000 200
IV. <u>Coots:</u>			900,000	8/31				500,000	950,000

3-1750  
(July 1946)

(over)

Form NR-1



## SUMMARIES

### Total Production:

Geese 1,000

Ducks 147,000

Coots 500,000

Total waterfowl usage during period 1,431,800

Peak waterfowl numbers 1,282,950

Areas used by concentrations Malheur Lake, Blitzen Valley  
and Double-O Units.

Principal nesting areas this season Malheur Lake and the  
Blitzen Valley.

Reported by Ray C. Erickson  
Ray C. Erickson, Ref. Mgr.

## INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since the data are necessarily based on an analysis of the rest of the form.



3-1751

Form NR-1A

(Nov. 1945)

MIGRATORY BIRDS  
(other than waterfowl)Refuge MalheurMonths of May to August 1948

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. <u>Water and Marsh Birds:</u>										
Eared grebe			10,000	8/31				4,000	10,000	12,000
Western grebe			2,500	8/31				900	1,500	5,000
Pied-billed grebe			4,000	8/31				1,200	3,000	6,000
White pelican			500	8/31						800
Farallon cormorant			700	8/31				300	500	700
Treganza's heron			1,200	8/31				350	500	1,300
American egret			700	8/31				225	400	850
Brewster's egret			300	8/31				100	200	350
Black-crowned night heron			4,000	8/31				1,500	3,500	5,000
American bittern			900	8/31				350	900	1,100
Sandhill crane			650	8/31				160	150	800
Virginia rail			800	8/31				300	1,000	1,000
Sora rail			1,200	8/31				400	1,300	1,400
II. <u>Shorebirds, Gulls and Terns:</u>										
Killdeer			2,000	8/31				500	1,500	3,000
Long-billed curlew			300	8/31				100	250	600
Spotted sandpiper			200	8/31						300
Western sandpiper			4,000	8/31						5,000
Western willet			75	8/31				25 -	60	100
Red-backed sandpiper			50	8/31						100
Dowitcher			8,000	8/31						10,000
Avocet			3,000	8/31						3,500
Black-necked stilt			150	8/31						250
California gull			2,500	8/31				600	1,200	2,800
Ring-billed gull			800	8/31				125	250	1,000
Franklin's gull			60	8/31				25	60	75
Forster's tern			35,000	8/31				10,000	15,000	40,000
Caspian tern	1	5/12	20	8/31				10	12	25
Black tern			20,000	8/31				6,000	8,000	25,000

(over)



(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u>					
Mourning dove		3,500	8/31	3,000	4,500
White-winged dove					
IV. <u>Predaceous Birds:</u>					
Golden eagle		14	8/31	7	14
Duck hawk					
Horned owl		70	8/31	40	70
Magpie		800	8/31	300	800
Raven		180	8/31	100	200
Crow		600	8/31	400	700
Swainson's hawk		80	8/31	50	100
Red-tailed hawk		22	8/31	12	25
American rough-leg		2	8/1		4
Reported by <i>Ray C. Erickson</i>					

#### INSTRUCTIONS

Ray C. Erickson, Refuge Mgr.

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiformes)  
 II. Shorebirds, Gulls and Terns (Charadriiformes)  
 III. Doves and Pigeons (Columbiformes)  
 IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)
- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total number of the species using the refuge during the period concerned.



UPLAND GAME BIRDS

1613

Refuge Malheur Months of May to August, 1948

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio		(5) Removals		(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked pheasant		✓	200		1 - 1.5				8,000	Due to early high water in more concentrated nesting areas, many nests were believed flooded. Later success indicated by many small chicks late in season.
Valley quail			30	600					1,200	
Hungarian partridge			4						50	
Sage grouse			25	200					400	



## INSTRUCTIONS

### Form NR-2 - UPLAND GAME BIRDS.\*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

\* Only columns applicable to the period covered should be used.



## REFUGE GRAIN REPORT

Refuge Malheur National Wildlife Refuge  
Burns, Oregon

Months of May thru August 1948.

[illegible]

- (8) Indicate shipping or collection points.....
- (9) Grain is stored at P-Ranch, Buena Vista, and Refuge Headquarters.....
- (10) Remarks.....



NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lbs., Corn (ear)—70 lbs., Wheat—60 lbs., Barley—50 lbs., Rye—55 lbs., Oats—30 lbs., Soy Beans—60 lbs., Millet—50 lbs., Cowpeas—60 lbs., and Mixed—50 lbs. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

- (1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.
- (3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.
- (4) A total of Columns 2 and 3.
- (6) Column 4 less Column 5.
- (7) This is a proposed breakdown by varieties of grain listed in Column 6.
- (8) Nearest railroad station for shipping and receiving.
- (9) Where stored on refuge: "Headquarters grainary", etc.
- (10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.



## 6. Preparation of reference collections.

About two hundred specimens of plants, most of them aquatic or marginal species, were collected and preserved during the summer. These will be identified and placed in the refuge herbarium during the winter whenever time permits. Along with plant collecting, seeds were also taken and stored for future use in food habits studies.

No special effort was made to collect and prepare bird and mammal skins although specimens and two ducks and a mink were found dead and were prepared in the form of study skins. Should it be found necessary to make a concentrated effort to expand this collection more rapidly, permission will have to be obtained to take live specimens.

In the herpetological collection, additions include preserved specimens of about 15 rattlesnakes, two yellow-bellied racers, about 5 garter snakes, two bullsnakes, about 15 spadefoot toads and three dozen spadefoot toad tadpoles, several frogs and a horned lizard. Some of the above have been identified but the rest will have to await the word of an authority on this subject. This collection is small but will be expanded as additional reptiles and amphibians are obtained. All specimens are preserved in formalin.

## VI PUBLIC RELATIONS

### A. Recreational Uses.

About 600 recreational visitors enjoyed the use of the Refuge during the period. Over 200 of these were anglers who largely reported good success for rainbow trout.

The usual number of business visitors were present which numbered about 150.

### B. Refuge Visitors.

May 11	Ellis Mason, Biologist, Oregon State Game Commission
	A. Boyd Claggett, Biologist, " " " "
May 18	W. A. Sawyer, Supt., Squaw Butte Range Experiment Station
	R. C. Davis, Harney County Agricultural Agent
May 21	H. H. Sheldon, Photographer, Portland, Oregon
May 24	Dr. and Mrs. Russell T. Congdon, Wildlife Photographer, Wenatchee, Washington
May 30	James C. Savage, Game Management Agent, Klamath Falls, Ore.
June 2	H. D. Willis, Regional Engineer, Portland, Oregon
June 8	Wilma Morrison, Staff Writer, The Oregonian, Portland, Ore.
June 12-13	Dr. and Mrs. Ira N. Gabrielson, Washington, D. C.
	K. F. MacDonald, Regional Refuge Supervisor
	Mrs. Peggy Gallagher, Washington, D. C.



June 15	John E. Schwartz, Refuge Manager, Sheldon Refuge
June 19	W. N. Anderson, Asst. Regional Refuge Supervisor
	Helen Hunter, Stenographer, Regional Office
June 21-22	Dr. Don Hill, Head Farm Crops Dept., Ore. State College
	H. L. Schudel, Farm Crops Instructor, " " "
July 16-17	Justice W. O. Douglas, Washington, D. C.
	Elon Gilbert, Yakima, Washington
July 28	Ben Hazeltine and Mrs. Hazeltine, Medicine Lake Refuge
	Paul Quick, Asst. Regional Director, Portland, Oregon
August 3	H. H. Sheldon, Photographer, Portland, Oregon
August 4	Paul Quick, Asst. Regional Director, Portland, Oregon
	K. F. MacDonald, Regional Refuge Supervisor
	Mr. Northrup, Bureau of Budget, Washington, D. C.
	Walt L. Dutton, Chief Range Management, Forest Service, Washington, D. C.
	Glenn Mitchell, In charge Game Management, Region 6, Portland, Oregon
	Fred Kennedy, " " Range " " "
	L. L. Swift, Range Management, Washington, D. C.
August 5	John E. Schwartz, Refuge Manager, Sheldon Refuge
August 10	Phil Schneider, Oregon State Game Commission
	A. V. Meyers " " " "
August 11	H. D. Willis, Regional Engineer, Portland, Oregon
	Lee Jacoby, Asst. " " " "
	Frank Boomhower, Game Management Agent, Portland, Ore.
August 15	Elmo Adams, Refuge Manager, Hart Mt. Refuge
August 20	Carl Ewing, Forest Supervisor, Umatilla Nat'l. Forest
	Lyle Simpson " " Whitman " "
August 29	L. R. Ramelli, Refuge Manager, Red Rock Lakes Refuge

On May 11, the Blue Mt. Nature Club consisting of a group of ten visited the refuge and were shown about by Dr. Ray C. Erickson, Refuge Biologist.

On May 29, a group of Western Oregon Isaac Walton League members were shown about the refuge. This group was headed by Oregon State Secretary Alan Gribble.

On May 30, Game Management Agent, James C. Savage with two members of the Junior Chamber of Commerce of Klamath Falls, Oregon, paid the Refuge a visit.

Wilma Morrison, staff writer for The Oregonian, spent June 8-9 on the Refuge with a group of four, assembling information for an article which appeared as a feature article at a later date.

#### C. Refuge Participation.

On May 4, Refuge Superintendent Scharff assisted in instructing some 80 attendants of a Tourist School being conducted in Burns, Oregon. Instruction was given on routes of travel, points of interest, and how and who to contact for information.



The State Isaac Walton League Big Game Committee meeting was attended by Superintendent Scharff on May 30.

On July 22, a talk on the Malheur Refuge and how it fits the National Conservation picture was given before a group of 12 Eastern Editors and over 60 representatives of local civic organizations of Burns, Oregon. The Refuge and its part in conservation seemed to attract as much attention as any other local activity discussed.

Two Burns Chamber of Commerce meetings were attended during the period by the Refuge Superintendent.

Three meetings of the Burns Chapter of the Isaac Walton League were attended by the Refuge Superintendent and Refuge Personnel.

## VII OTHER ITEMS

### A. Items of Interest.

All refuge horses were vaccinated for brain fever in May and June.

All yearling foals were branded in June and the colts castrated.

The refuge mares were bred during the period and taken to summer pasture in the foothills of Steens Mt.

June 10 to 13 was spent in the Regional Office by the Refuge Superintendent discussing and planning for water distribution during the current season.

On May, Dr. Russell Congdon of Wenatchee, Wash., showed several reels of colored pictures taken on Malheur Refuge to a Isaac Walton group meeting in Burns. Dr. Congdon perhaps has the best picture story of Malheur Refuge available today and has given the Refuge much very desirable publicity.

A similar show was given the Burns Chapter of Kiwanis during the early part of June.

On June 10, a group of 10 County Agents spent the entire day on the Refuge largely reviewing the area proposed for homesteading by Veterans.

June 27 to July was spent in the Regional Office by the Refuge Superintendent on the current maintenance and operation accounts.

On August 27, the Burns Garden Club was entertained at the Refuge Headquarters, 24 members made the trip.

August 10 was spent by Superintendent Scharff and Dr. Erickson with State Biologists Meyers and Schneider discussing a proposed Public Shooting area and reviewing possible sites.



August 11-14 was spent in the Regional Office by Superintendent Scharff planning with Regional And State personnel for the administration of a State supervised Public Shooting Area on the Malheur Refuge.

J. C. Scharff  
J. C. Scharff  
Superintendent





Fig. 1\* Malheur National Wildlife  
Refuge Headquarters,  
August 7, 1948



Fig. 2 Members of the Blue Mt. Nature  
Club of LaGrande on bird Study  
trip through the refuge,  
May 15, 1948

\*All photographs (except as noted) taken by Biologist  
Ray C. Erickson and developing and printing done by  
Refuge Maintenance Man Alfred S. Ludi and Erickson.





Fig. 3 First nest record of the Franklin's gull in Oregon, found out in Malheur Lake, Harney County, June 7, 1948



Fig. 4 Three chicks and one unhatched egg of long-billed curlew in Distichlis-Juncus meadow, June 3, 1948





Fig. 5 Sandhill crane chick in Unit 8  
marsh, Malheur Refuge, June 15, 1948



Fig. 6 Nest of Western mourning dove on  
ground along highway at the Narrows,  
Malheur Refuge, July 10, 1948



Fig. 7 Young ferruginous rough-legs and unhatched egg in nest in western juniper about *five* miles north of the Narrows, May 31, 1948



Fig. 8 Same nest as in Fig. 7 with young nearly able to fly. One juvenile not visible, June 26, 1948



Fig. 9 "Chief" -- Half Arabian and half thoroughbred stud used  
with refuge mares. Photo by H. H. Sheldon 1948



Fig. 10 Refuge mares and foals sired by "Chief".  
Photo by H. H. Sheldon 1948



Fig. 11. At the end of another busy week,  
members of the industrious Malheur  
Refuge staff find time for some  
pleasant, unsupervised relaxation.